(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 1 114 897 A2**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
11.07.2001 Bulletin 2001/28

(51) Int Cl.7: **E02F 9/08**

(21) Application number: **00204382.6**

(22) Date of filing: **07.12.2000**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE TR
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **17.12.1999 IT BO990691**

(71) Applicant: **NEW HOLLAND ITALIA S.p.A.**
I-41100 Modena (IT)

(72) Inventors:
- **Contoli, Piercarlo**
  48018 Faenza (RA) (IT)
- **Ragazzini, Corrado**
  48013 Brisighella (RA) (IT)

(74) Representative: **Vandenbroucke, Alberic et al**
New Holland Belgium NV.
Patent Department
Leon Claeysstraat, 3A
8210 Zedelgem (BE)

(54) **Earthmoving machine**

(57) An earthmoving machine comprises a driver's cab (11) and a propulsion device (12) for powering the machine which are both located on opposite sides of a central lift arm (7). The propulsion device (12) has a cooling device (13) located substantially above the propulsion device (12) enabling a considerable reduction of the distance between a front and rear drive axle of the machine, thereby enhancing the manoeuvrability of the machine.

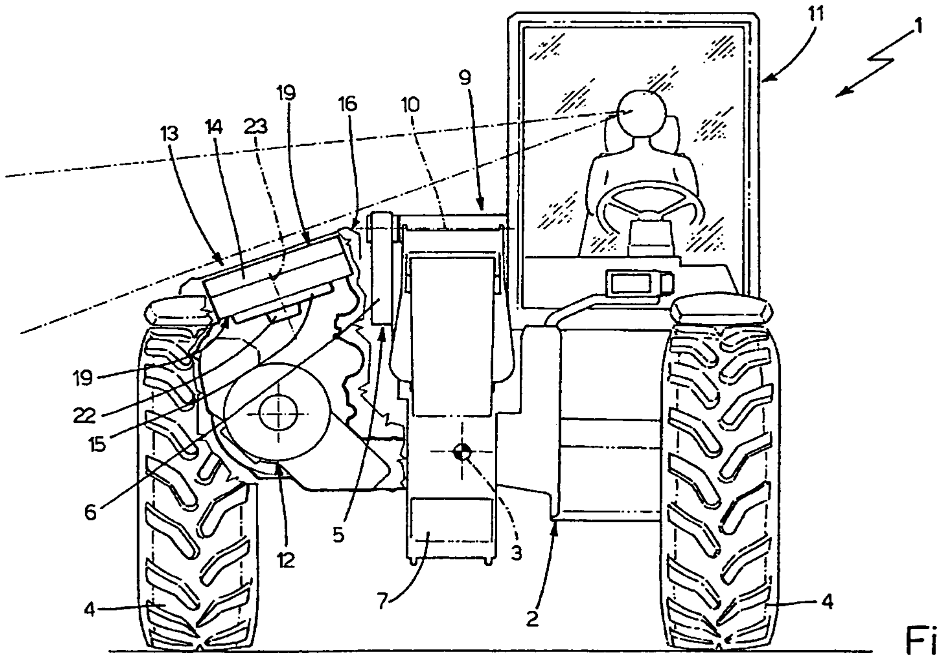

Fig.1

Printed by Jouve, 75001 PARIS (FR)

Description

[0001] The present invention relates to an earthmoving machine, more particularly for industrial or agricultural use.

[0002] Such machines commonly comprise two axles extending crosswise to a longitudinal axis of the machine and which each are provided with two drive wheels. The machine typically further comprises a driver's cab, propulsion means, in casu an internal combustion engine, for powering the machine, a lift arm between the cab and the propulsion means and a cooling assembly for cooling the propulsion means.

[0003] The cooling assembly is normally located between the propulsion means and one of the two axles, and conventionally comprises a substantially parallelepiped-shaped radiator in turn comprising two parallel major lateral faces perpendicular to the longitudinal axis of the machine, and an impeller or fan mounted in such a way that it faces one of the major lateral faces of the radiator to rotate about an associated axis of rotation substantially parallel to the longitudinal axis of the machine.

[0004] One drawback of known earthmoving machines of the above type lies in the location of the cooling assembly, which results in a relatively long wheel base - i.e. the distance, measured parallel to the longitudinal axis of the machine, between the two axles - thus reducing manoeuvrability because of the relatively large turning circle radius of the machine.

[0005] Another drawback of known earthmoving machines of the above type lies in the cooling assembly being located fairly close to the ground and one of the drive wheels, and therefore being fouled relatively easily by dirt thrown up by said drive wheel during operation of the machine.

[0006] It is an object of the present invention to provide an earthmoving machine designed to eliminate the aforementioned drawbacks.

[0007] According to the present invention, there is provided an earthmoving machine comprising :

- a lift arm mounted for rotation about a first axis;
- a driver's cab;
- propulsion means for powering the machine, said propulsion means and said cab being located on opposite sides of said lift arm; and
- cooling means for cooling said propulsion means.

[0008] The machine is characterized in that said cooling means are located substantially above said propulsion means.

[0009] A non-limiting embodiment of the present invention will now be described, by way of example, with reference to the accompanying drawings, in which :

Figure 1 shows a front view, with parts removed for clarity, of a preferred embodiment of the machine according to the present invention;
Figure 2 shows a side view of the Figure 1 machine;
Figure 3 shows a view in perspective, with parts removed for clarity, of a first detail in Figure 1;
Figure 4 shows a view in perspective of a second detail in Figure 1; and
Figure 5 shows a partly exploded view in perspective of the Figure 4 detail.

[0010] Reference number 1 in Figure 1 indicates as a whole an earthmoving machine comprising a frame 2 having a longitudinal axis 3 and being supported by two known axles (not shown) extending crosswise to axis 3. Each of the axles is provided with two conventional drive wheels 4.

[0011] Machine 1 further comprises a central supporting member 5 fixed to frame 2 and in turn comprising two parallel elongated plates 6 provided parallel to and on either side of axis 3. Furthermore, a telescopic lift arm 7 is hingeably attached to a rear end 8 of member 5 (Figures 4 and 5) to swing, with respect to member 5 and by virtue of a known actuating device 9 such as a hydraulic cylinder, about an axis 10 substantially crosswise to axis 3.

[0012] Machine 1 also comprises on the one hand a driver's cab 11 on one side of the arm 7 and on the other hand an engine 12 for powering machine 1 and which is located between the wheels 4 on the opposite side of arm 7 relative to the cab 11.

[0013] Engine 12 has a longitudinal axis 12a substantially parallel to axis 3, and a cooling assembly 13 located, for a large part, above engine 12. The cooling assembly 13 comprises a radiator 14 and an impeller 15, which are both housed, together with engine 12, inside a casing 16 comprising an air inlet grille 17 and three air outlet grilles 18.

[0014] With reference to Figures 1 and 3, radiator 14 is positioned facing grille 17 and is substantially parallelepiped-shaped. It has two parallel, major lateral faces 19, and is fitted to frame 2 so that the two faces 19 form an angle other than zero with axis 10. More specifically, the two faces 19 slope downwardly from the central member 5 towards one side of the machine to prevent the assembly 13 from blocking the view of the driver inside cab 11 on the one hand, and to prevent an excessive amount of dirt from depositing on the assembly 13 on the other hand.

[0015] In the example shown, radiator 14 is composed of different cooling circuits 20, 21, one associated with the hydraulic circuit of the machine 1 to cool the oil therein, the other one being associated with the engine 12 for cooling the intake air thereof.

[0016] Impeller 15 is located between radiator 14 and engine 12, and is mounted to rotate, with respect to radiator 14 and by virtue of a known actuating device 22 (in the example shown, a hydraulic motor), about an axis 23 substantially perpendicular to the two faces 19. In this connection, it should be pointed out that impeller 15 is operable to feed the air inside casing 16 along a path P (Figure 3) extending between grille 17 and the three grilles 18, so as to cool radiator 14 and also assist in cooling engine 12.

[0017] The location of cooling assembly 13 provides for obtaining a relatively short wheel base of machine 1 (i.e. the distance, measured parallel to axis 3, between the axles). In so doing, the manoeuvrability of machine 1 is improved by reducing the turning circle radius when compared to the earthmoving machines belonging to the prior art. Moreover, the height of the cooling assembly 13 relative to the ground prevents an excessive amount of dirt thrown up by drive wheels 4 during operation of machine 1 from coming into contact with radiator 14 and impeller 15.

[0018] As best seen in Figures 1 and 2, the engine 12 has a front part of reduced height housing the transmission of the machine 1. This transmission is described in further detail in EP-A-1.002.759 and is intended to couple the output shaft of the engine to the front and rear drive axles for moving machine 1. Due to the compactness of the transmission and the fact that the output shaft of the engine 12 is located in the lower part thereof, a free space is left above the transmission allowing parts of the cooling assembly 13, such as the impeller 15 and motor 22, to be located substantially in said free space. As a result, although the cooling assembly 13 is located above the engine assembly 12 as seen from the top, the lower part of the assembly 13 does not extend above the highest point of the engine 12, thereby reducing the obstruction to the operator's view.

[0019] Machine 1 further comprises a weight device 24 (Figures 4 and 5) for balancing the weight of arm 7. The device 24 is located at end 8 and comprises two fixed counterweights 25 fitted to the outer sides of plates 6 on either side of axis 3, and a counterweight 26 fitted in a removable manner to member 5 between the two counterweights 25 and crosswise to axis 3. When fitted to member 5, counterweight 26 delimits a rear housing 27. The housing 27 is defined, at end 8, between plates 6 and beneath arm 7 to house a power takeoff shaft 28 mounted to rotate, with respect to member 5 and by virtue of a known actuating device 29 (which could be a hydraulic motor or by means of a direct connection to the engine output shaft), about a longitudinal axis 30 substantially parallel to axis 3.

Claims

1. An earthmoving machine comprising :

   - a lift arm (7) mounted for rotation about a first axis (10);
   - a driver's cab (11);
   - propulsion means (12) for powering the machine, said propulsion means (12) and said cab (11) being located on opposite sides of said lift arm (7); and
   - cooling means (13) for cooling said propulsion means (12); and

   characterized in that said cooling means (13) are located substantially above said propulsion means (12).

2. A machine according to claim 1, characterized in that said cooling means (13) comprise a substantially parallelepiped-shaped radiator (14) having two substantially parallel major lateral faces (19); said first axis (10) forming an angle other than zero with said major lateral faces (19).

3. A machine according to claim 2, characterized in that said major lateral faces (19) slope downwardly from a central, vertical plane through the longitudinal axis (3) of the machine (1) towards one side thereof.

4. A machine according to claims 2 or 3, characterized in that said cooling means (13) further comprise an impeller (15) mounted for rotation about a second axis (23) substantially perpendicular to said major lateral faces (19).

5. A machine according to claim 4, characterized in that the machine (1) further comprises a casing (16) housing said cooling means (13) and said propulsion means (12); said impeller (15) feeding the air in the casing (16) along a given path (P) and said propulsion means (12) being located along said path (P).

6. A machine according to claims 4 or 5, characterized in that said propulsion means (12) comprises a transmission of reduced height, said impeller (15) being located downstream of the cooling means (13) in the free space above said transmission.

7. A machine according to any of the preceding claims characterized in that the machine further comprises a power takeoff (28) mounted to rotate about a third axis (30) substantially crosswise to said first axis (10).

8. A machine according to claim 7, characterized in that said power takeoff (28) is located at a rear portion (8) of said machine (1); said third axis (30) being substantially parallel to a longitudinal axis (3) of the machine.

9. A machine according to claim 8, characterized in that the machine further comprises balancing means (24) for balancing the weight of said lift arm (7); said balancing means (24) comprising at least one counterweight (26) fitted removably to the ma-

chine at said rear portion (8).

10. A machine according to claim 9, characterized in that the machine further comprises supporting means (5) for supporting said lift arm (7) and defining, at said rear portion (8), a housing (27) for said power takeoff (28); said counterweight (26), when fitted to the machine, defining the rear of said housing (27).

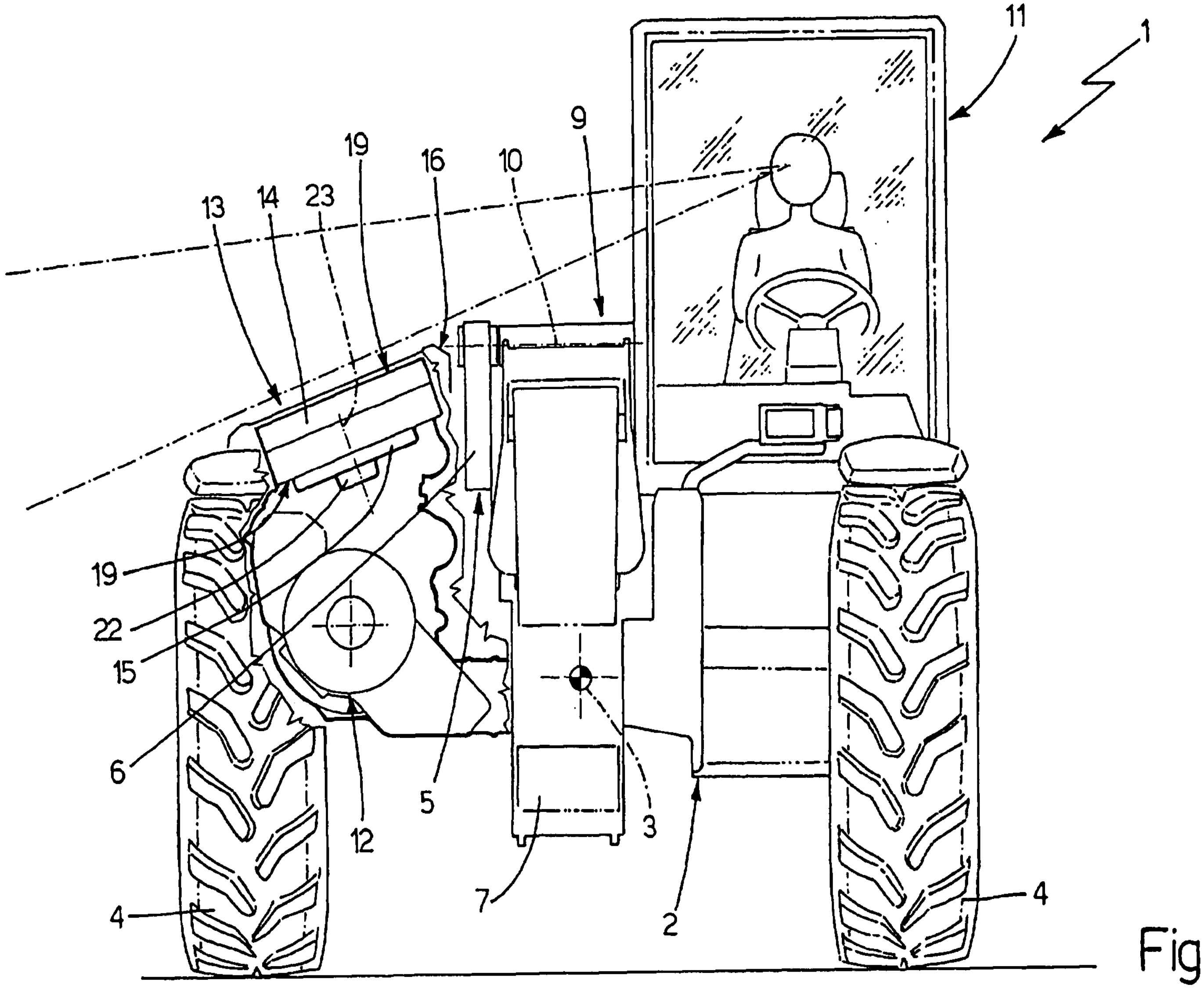

Fig.1

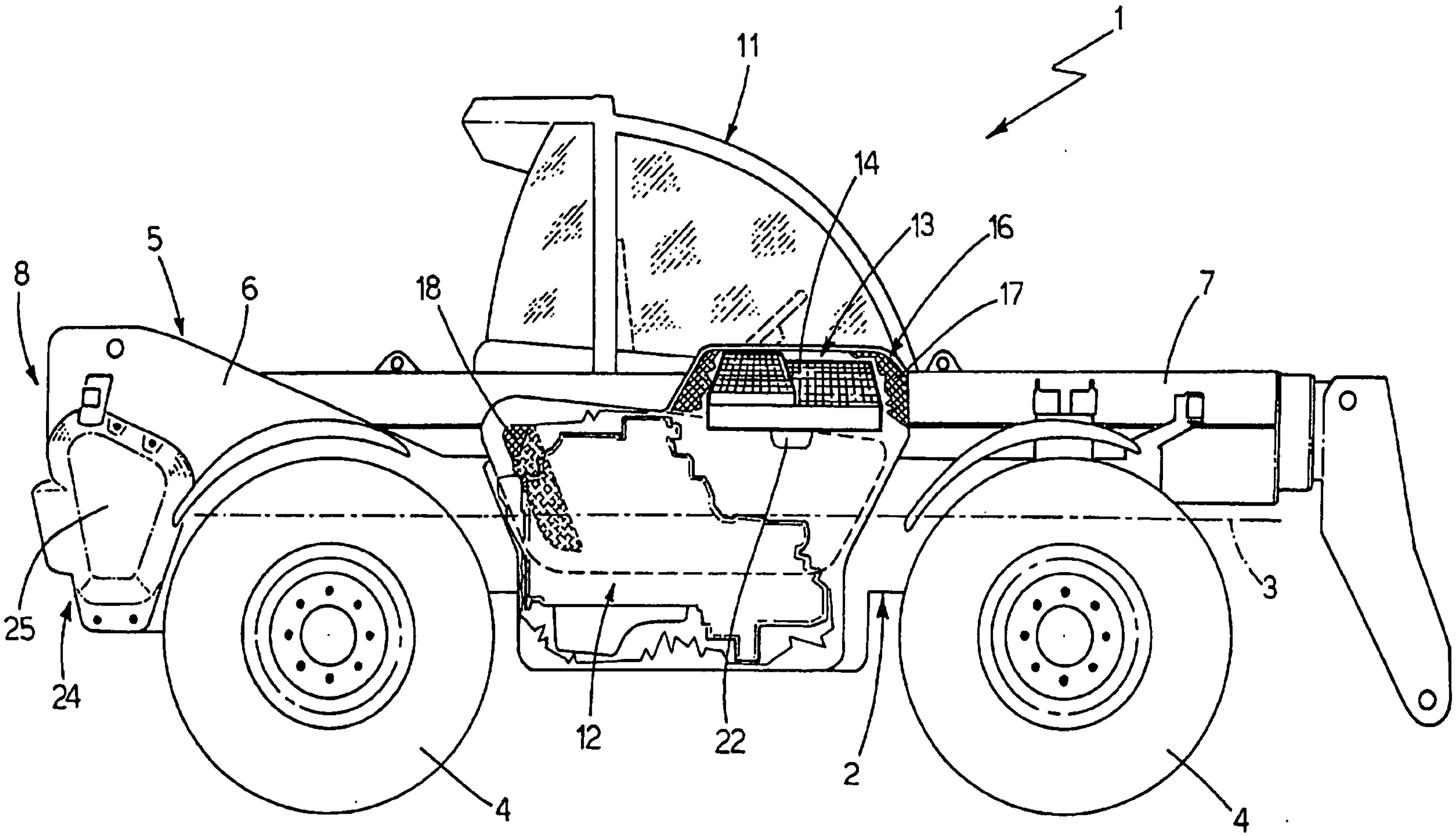

Fig.2

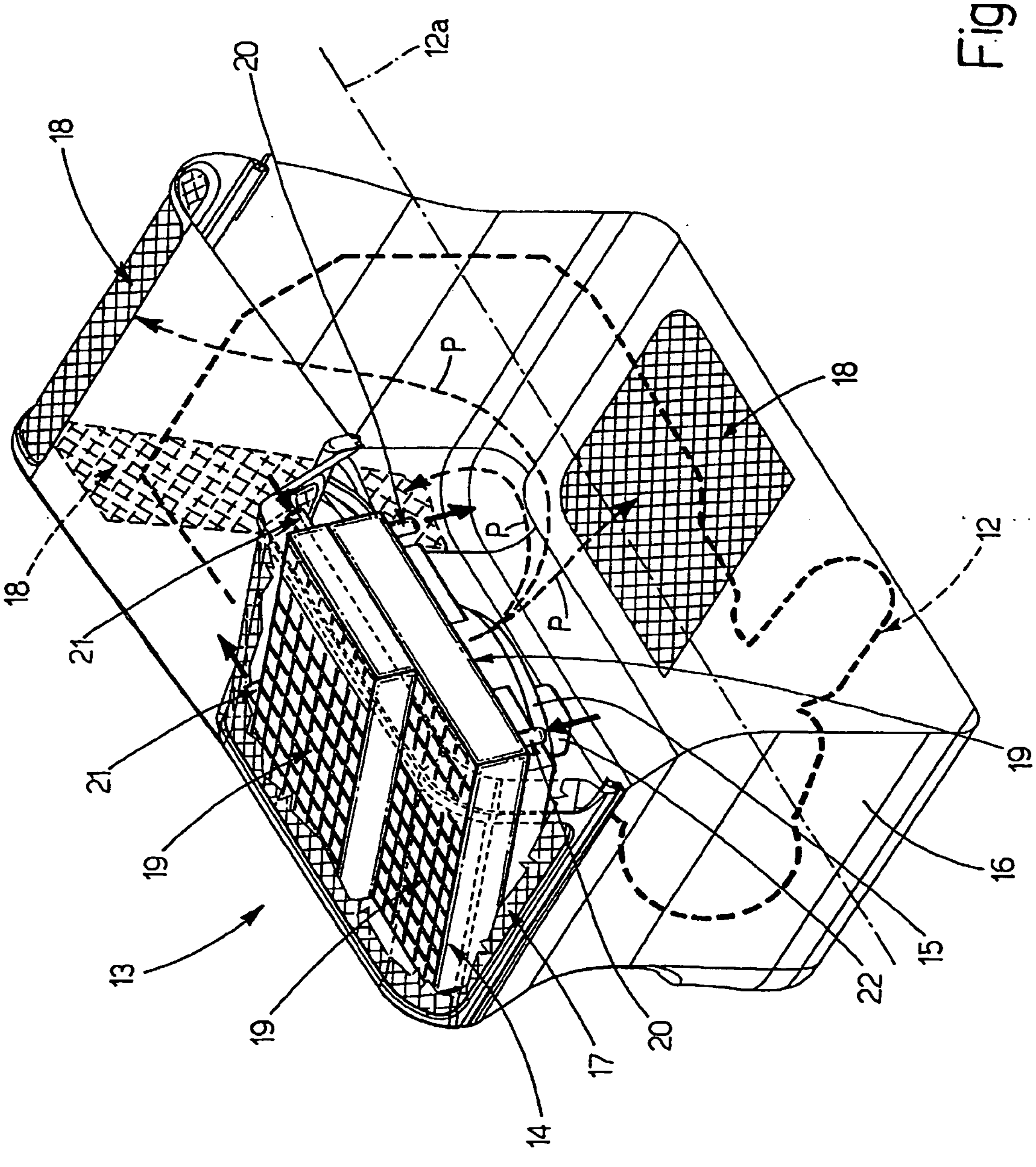

Fig.3

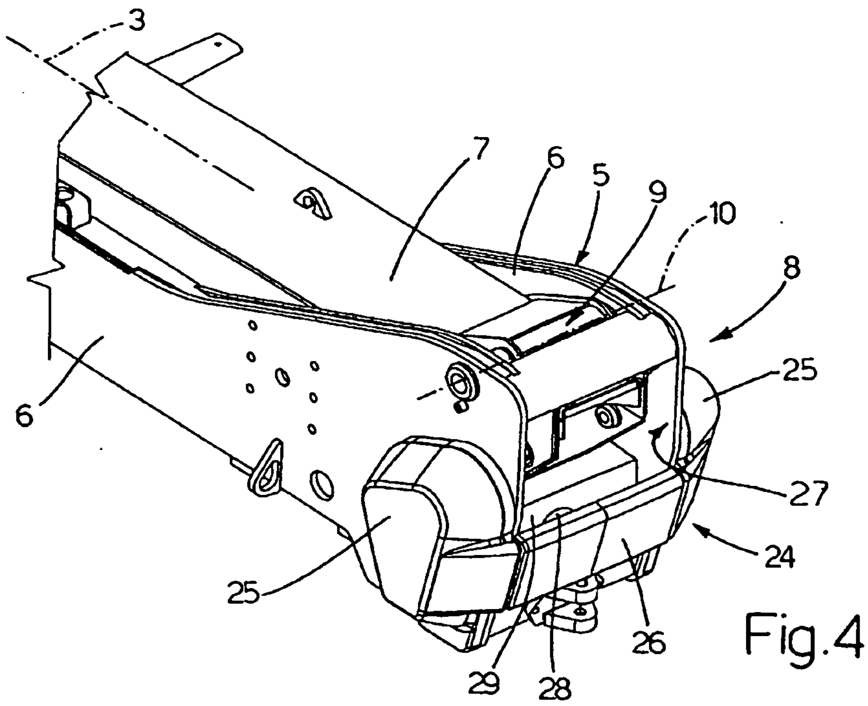

Fig.4

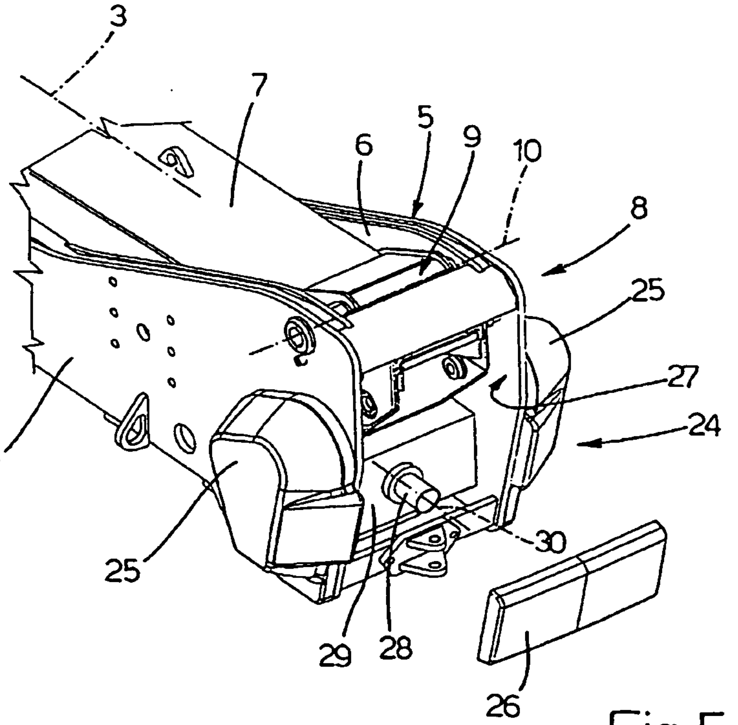

Fig.5